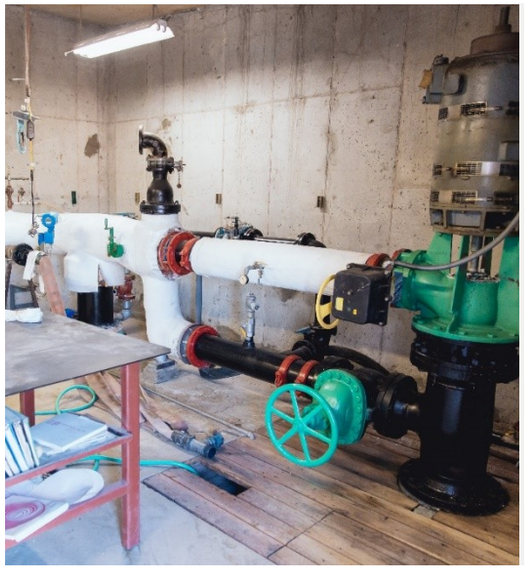

MT2030
CLIMATE
SUMMIT
SUN VALLEY 26
PRESENTED BY TORUS







CITY OF BOISE GEOTHERMAL









STEVE HUBBLE – CLIMATE ACTION MANAGER

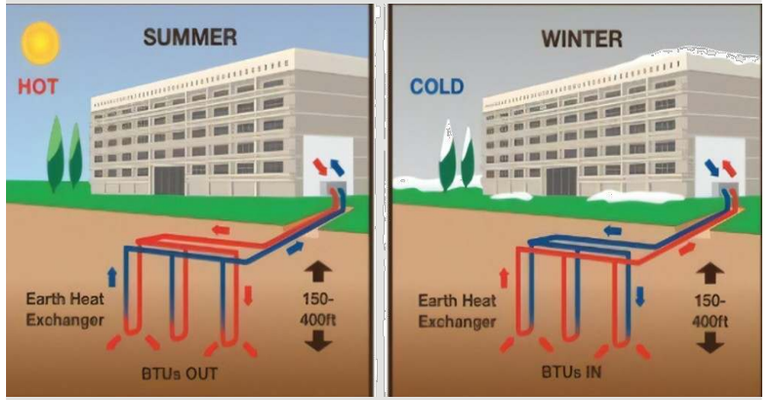
CITY OF BOISE – DEPARTMENT OF PUBLIC WORKS







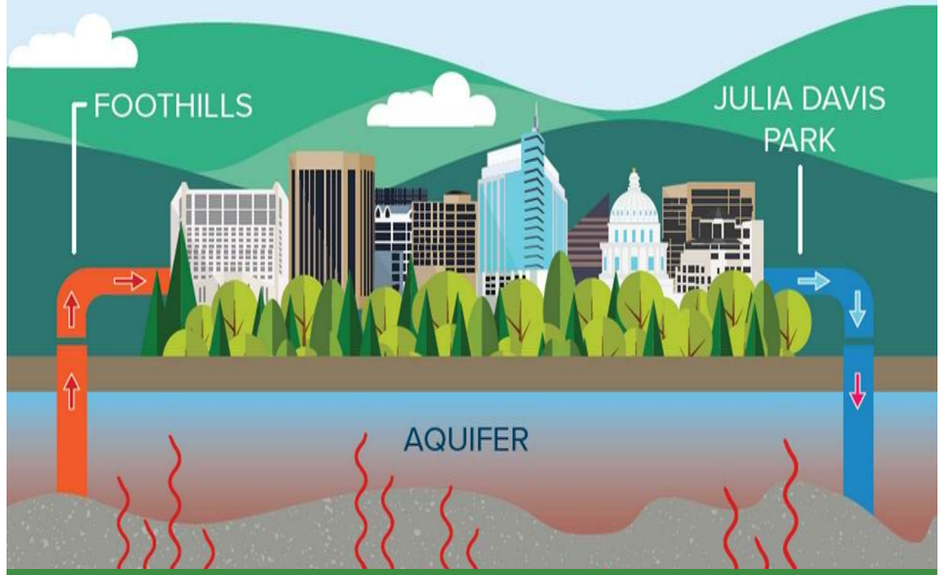
TYPES OF GEOTHERMAL



GROUND SOURCE GEOTHERMAL

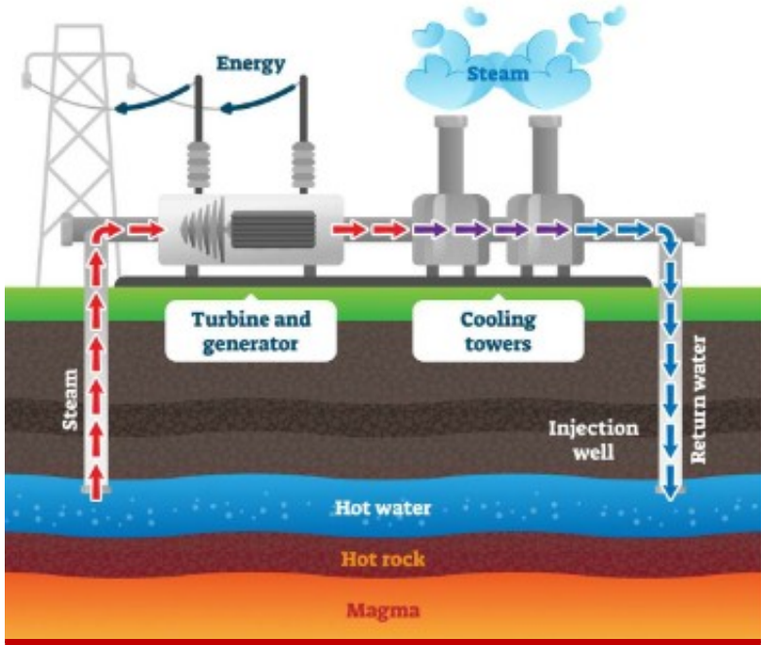
55° F ground temp

CITY OF BOISE UTILITY



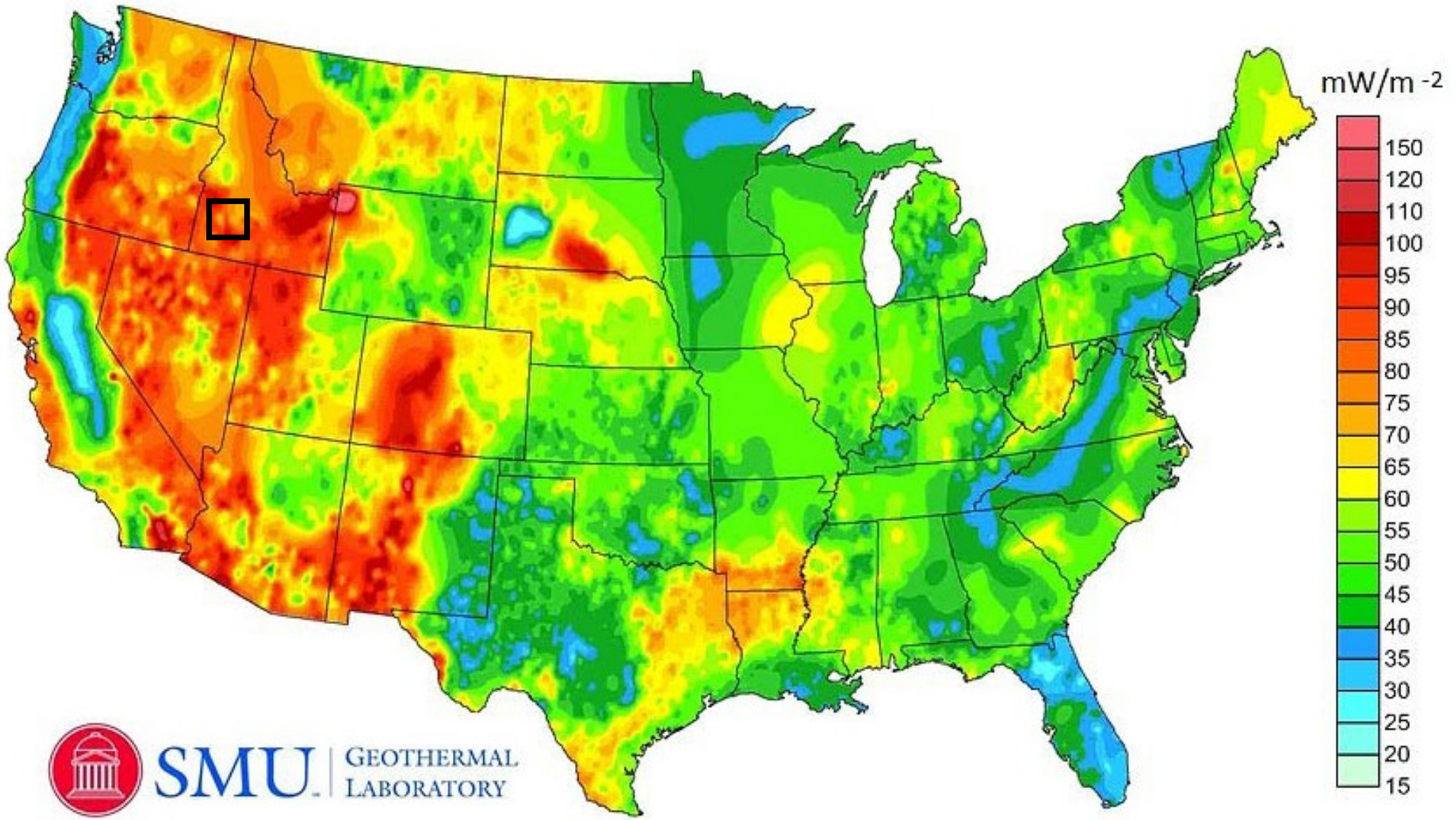
DIRECT USE GEOTHERMAL

Low Temperature Geothermal
150 - 250° F



GEOTHERMAL POWER GENERATION

High Temperature Geothermal
350° F or higher


mW/m -2
150
120
110
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
SMU
GEOTHERMAL
LABORATORY

GEOTHERMAL USES ACROSS THE STATE



Variety of Low Temperature Geothermal uses across Idaho

Geothermal Consumptive Water Use

- Irrigation
- Greenhouses
- Aquaculture
- Building heat (when water disposed)

Geothermal Non-Consumptive Water Use

- Building heat (water re-injected)

Boise geothermal History

Indigenous Americans have used this natural resource for thousands of years

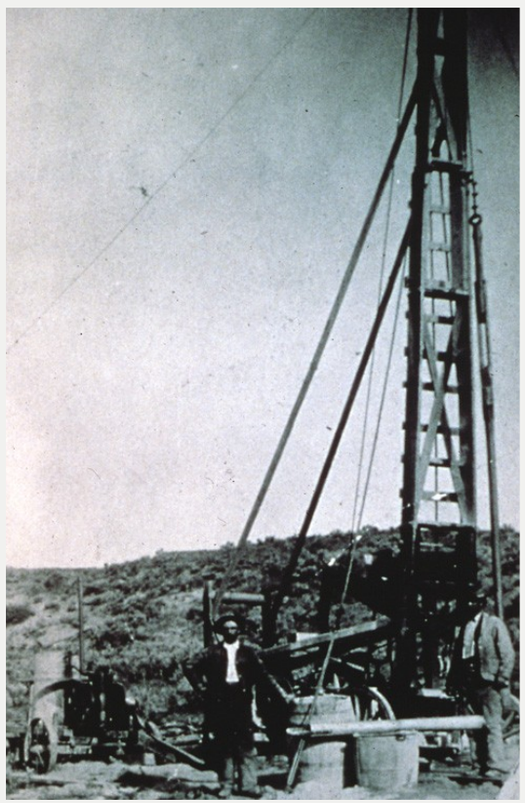
Shoshone and Paiute tribes frequented the hot springs in the Boise area

They were used for wintering, cooking, heat and medicinal purposes

Shoshone artwork: Tepees 2 by Pearson-Scott-Foresman



World's first
geothermal heating district

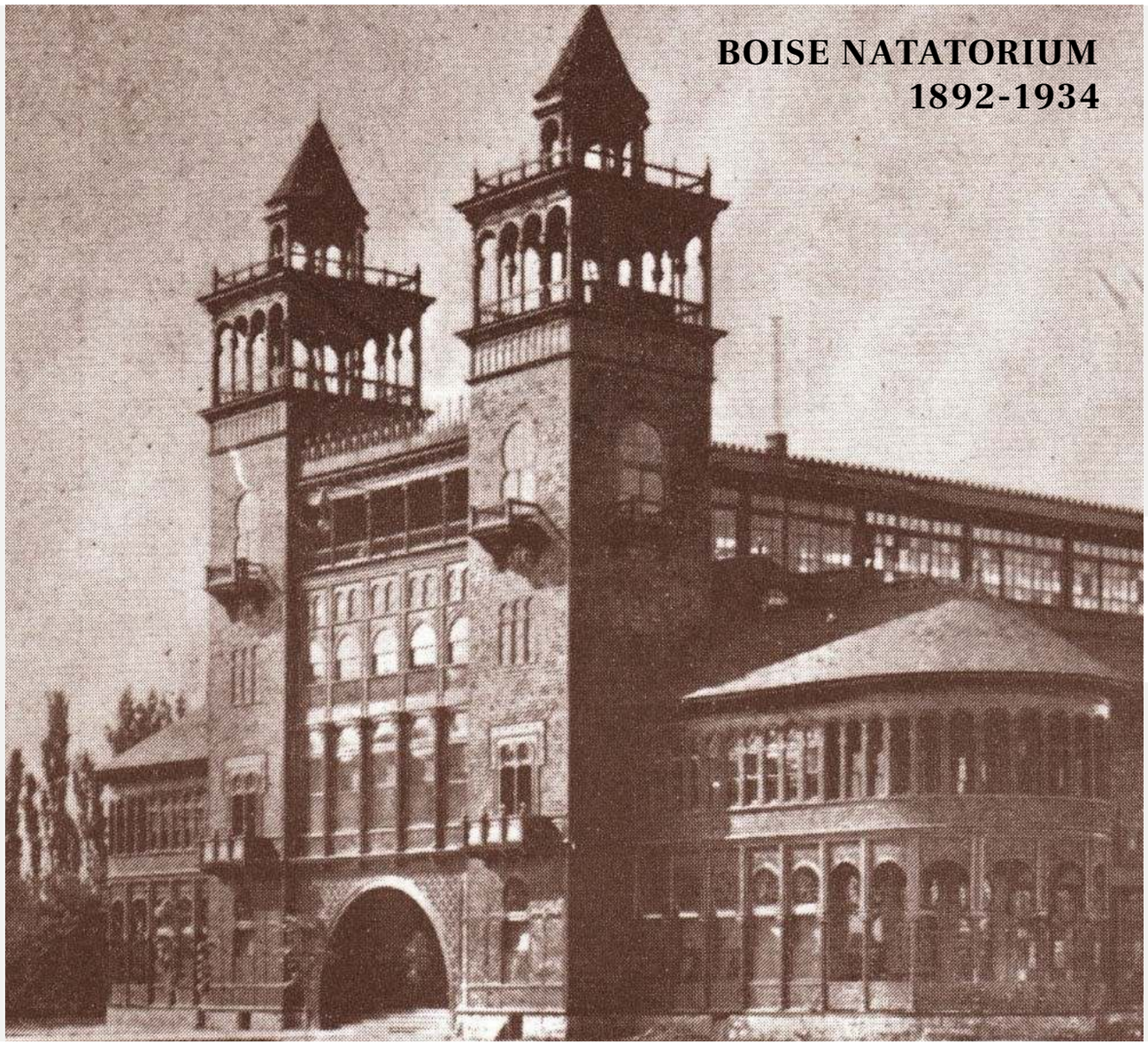


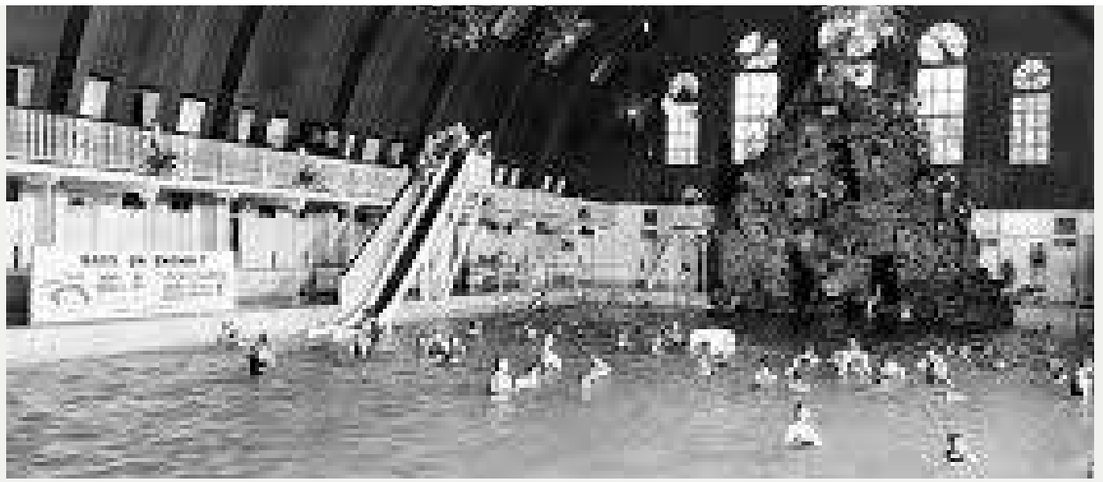


1891

World's first geothermal heating district is created.

First geothermal wells drilled along a fault in east Boise.





GEOTHERMAL DEVELOPMENT

1890-1983





BOISE'S GEOTHERMAL DISTRICTS

1891

BOISE WARM SPRINGS WATER DISTRICT

Historic
Water District

1970s - 1980s

CITY OF BOISE

Largest geothermal system in the USA

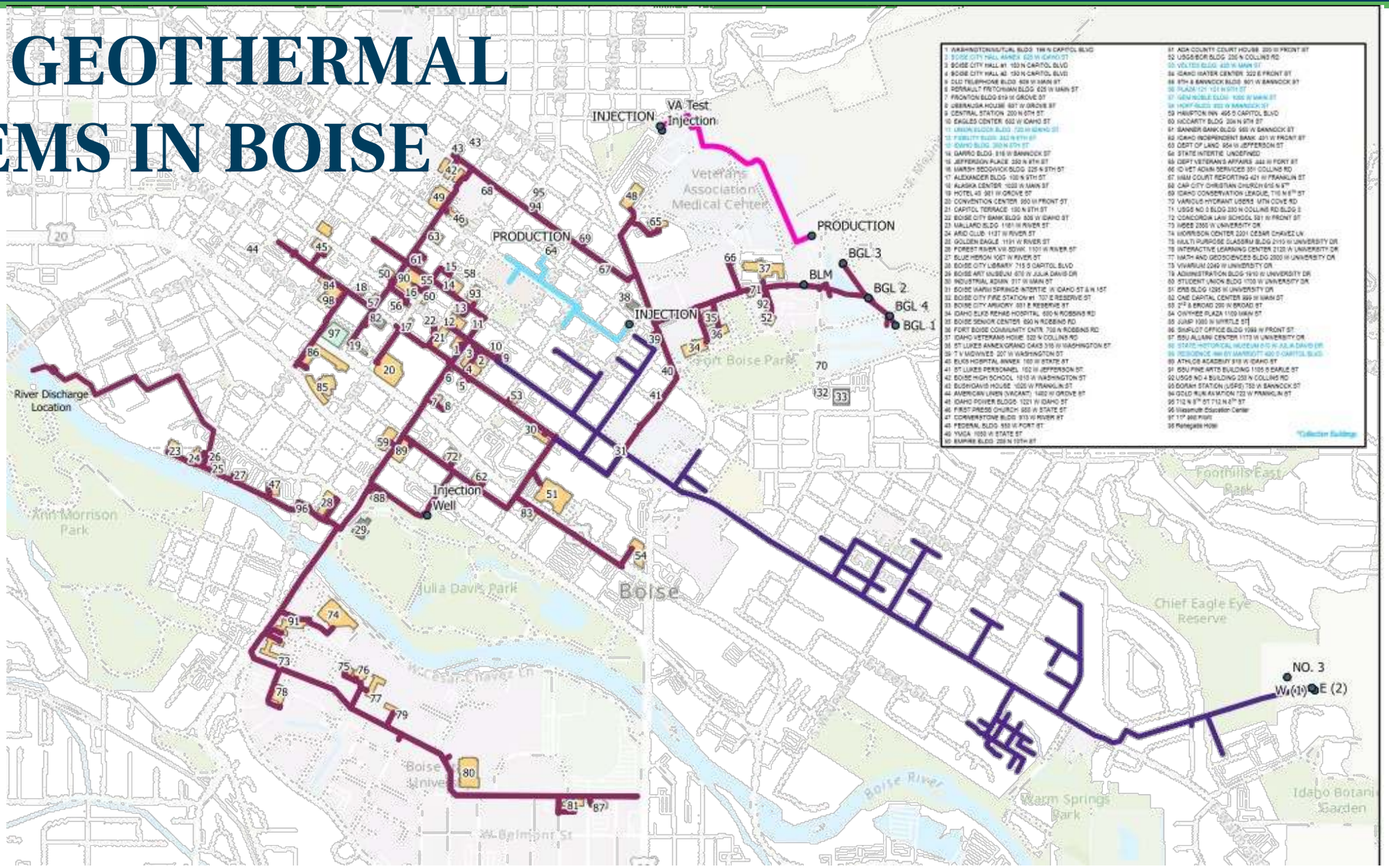
STATE OF IDAHO

Only US state capital heated by geothermal energy

FEDERAL

Veterans Administration campus

FOUR GEOTHERMAL SYSTEMS IN BOISE



Geothermal Water pumped out of aquifer

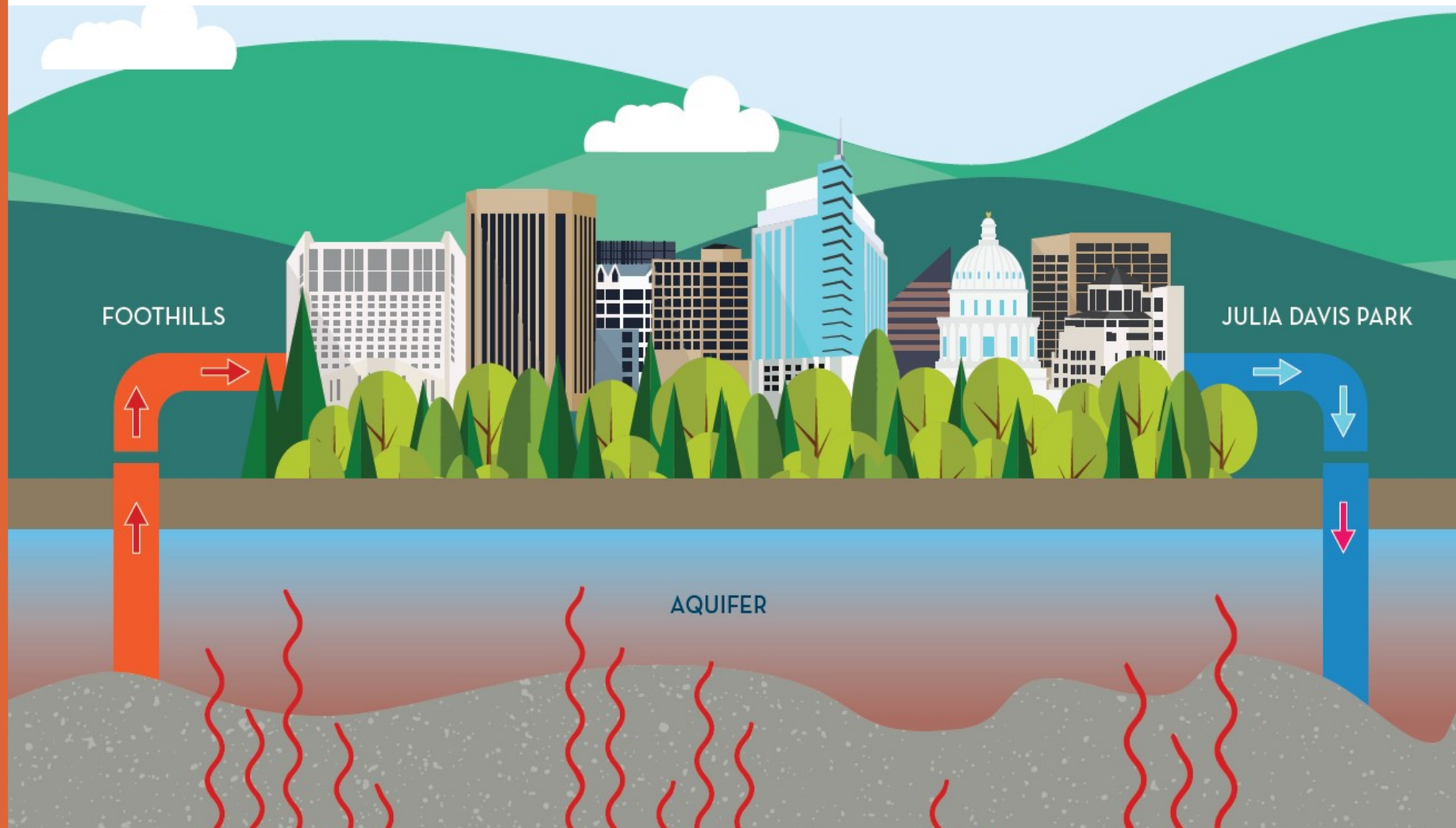
Network of pipes in downtown Boise

Delivered to ~100 buildings

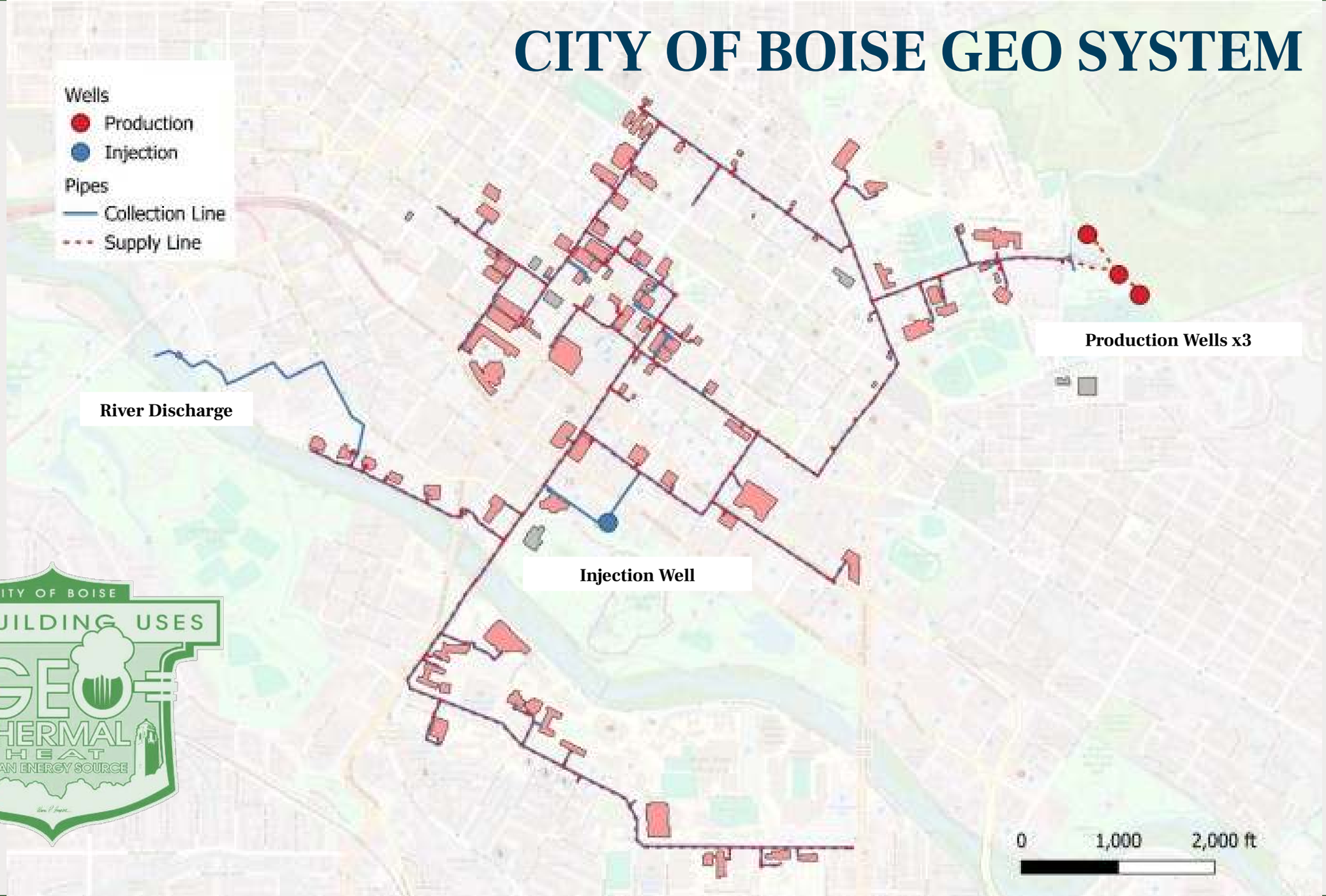
Buildings remove heat from the water (20-50° F)

Reinjected into aquifer at Julia Davis Park

How does it work?



CITY OF BOISE GEO SYSTEM



CITY OF BOISE
THIS BUILDING USES
GEO
THERMAL
HEAT
AS AN ENERGY SOURCE



BOISE CITY HALL



LIBRARY



BOISE HIGH


ADA COUNTY COURTHOUSE

DOWNTOWN BUILDINGS ON GEOTHERMAL



JUMP


ELKS HOSPITAL


BANNER BANK









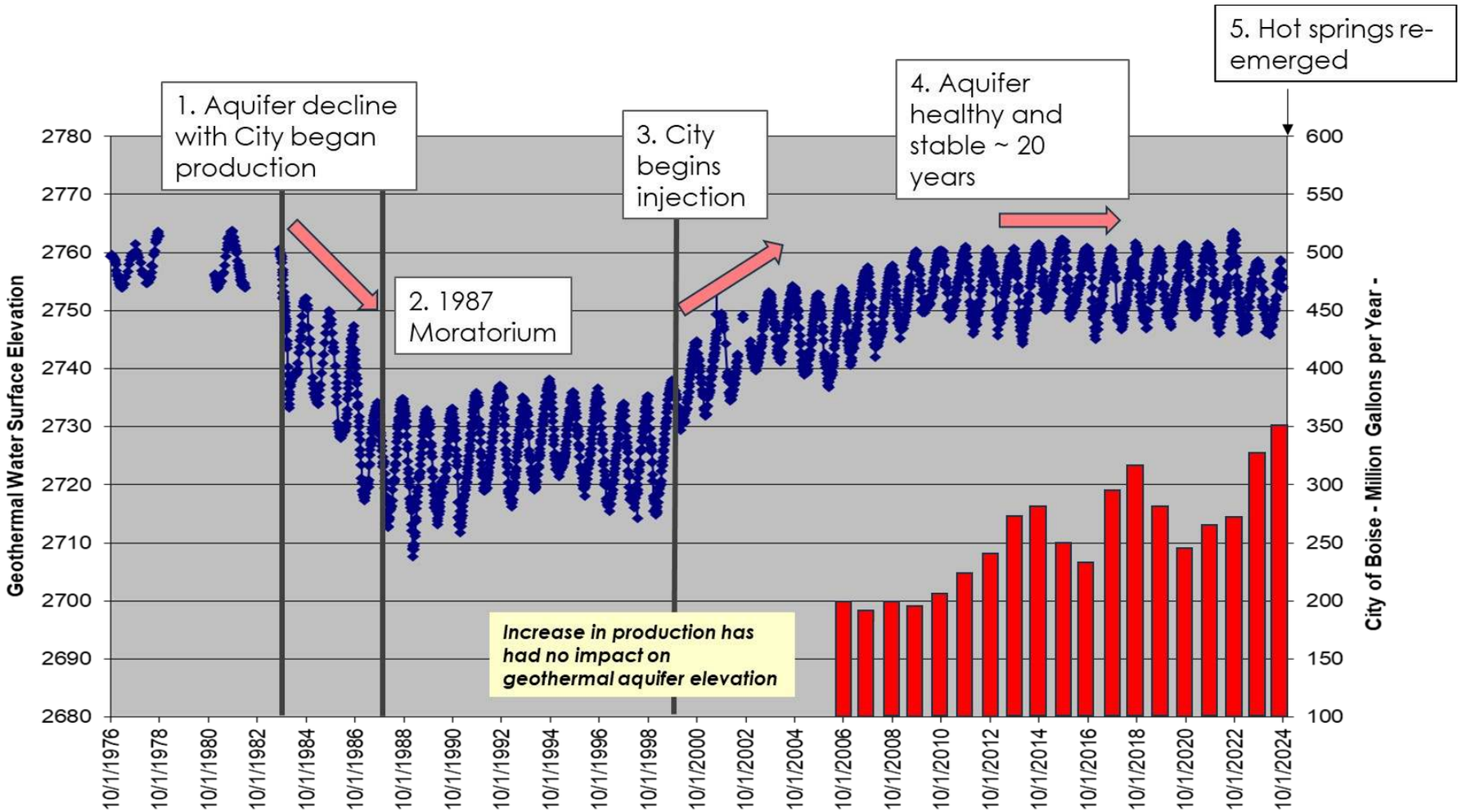
BOISE STATE UNIVERSITY





Boise front history

- City of Boise began production 1983 which caused aquifer decline.
- Moratorium was put in place 1987.
- City of Boise drilled injection well 1999 and aquifer replenished.
- Aquifer healthy and stable for ~ 20 years following injection.
- City of Boise still operates under same regulator conditions as when moratorium was put in place despite strong evidence of a healthy aquifer.



CURRENT OPPORTUNITIES AND CHALLENGES

- System Growth
- Water Rights
- Infrastructure Replacement
- National Geothermal Interest
- Funding

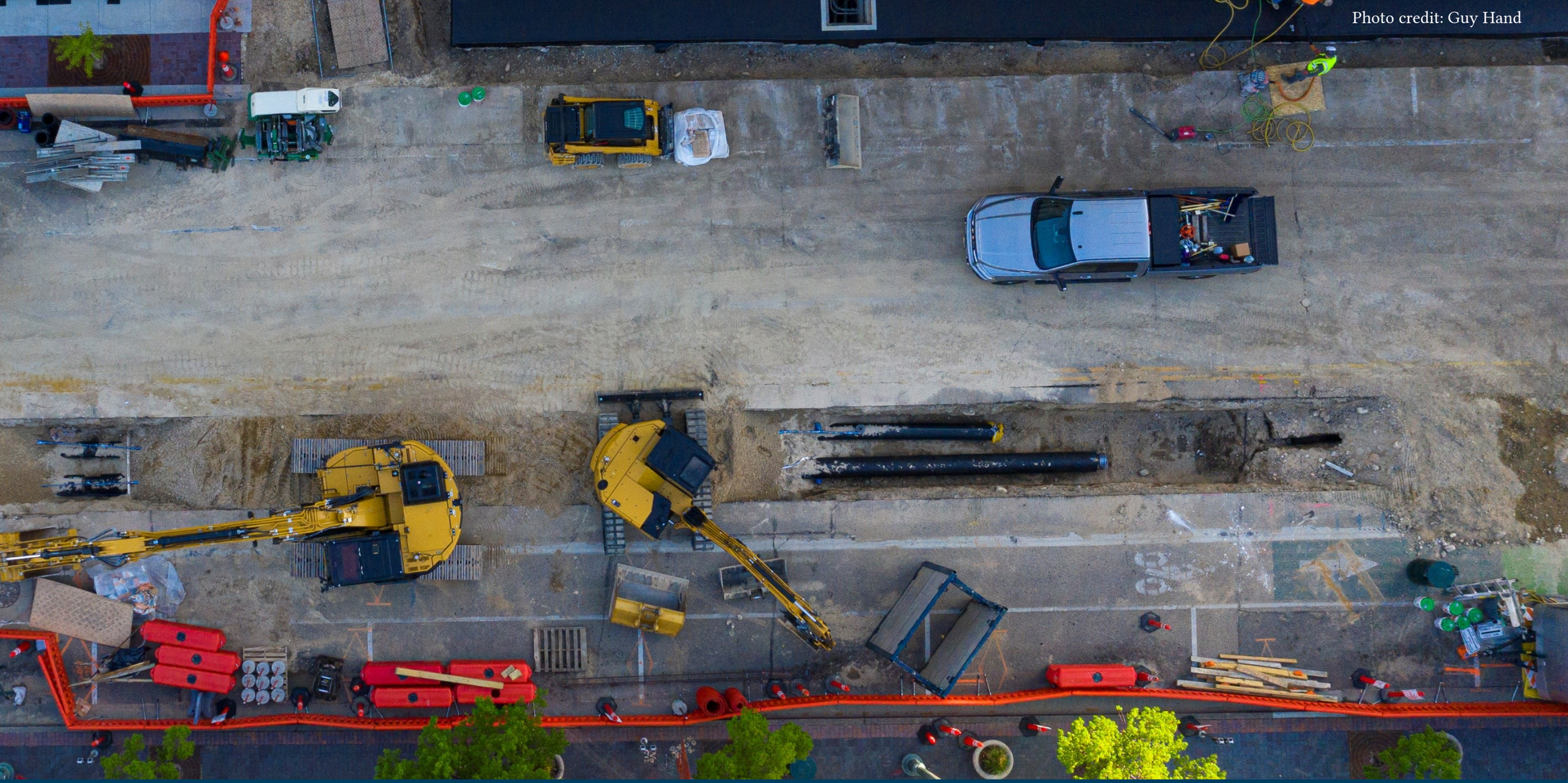


Photo credit: Guy Hand

GEOTHERMAL INNOVATIONS









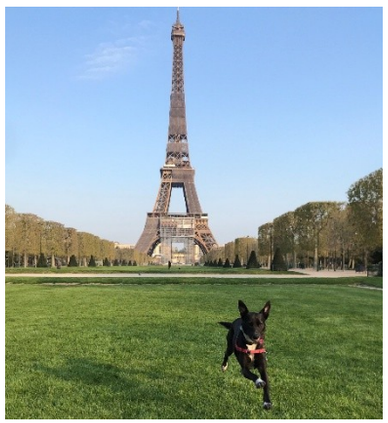
KATIE O'NEIL

ENERGY PROGRAM MANAGER

Katie is the City's Energy Program Manager, working in the Climate Action Team in Public Works with a focus on Buildings and Energy

An Idaho native, she has a Masters in Environmental Engineering from Stanford University and a background in Project management. Katie's expertise is in energy policy, building electrification, carbon credit and GHG accounting, and utility regulation.

Katie lives in Boise with husband and three kids, ages 5, 2 and 5 months, as well as a rescue dog.



INNOVATION – THERMOGRAPHY



(Capitol & Idaho)

INNOVATION – THERMOGRAPHY

LEAK!



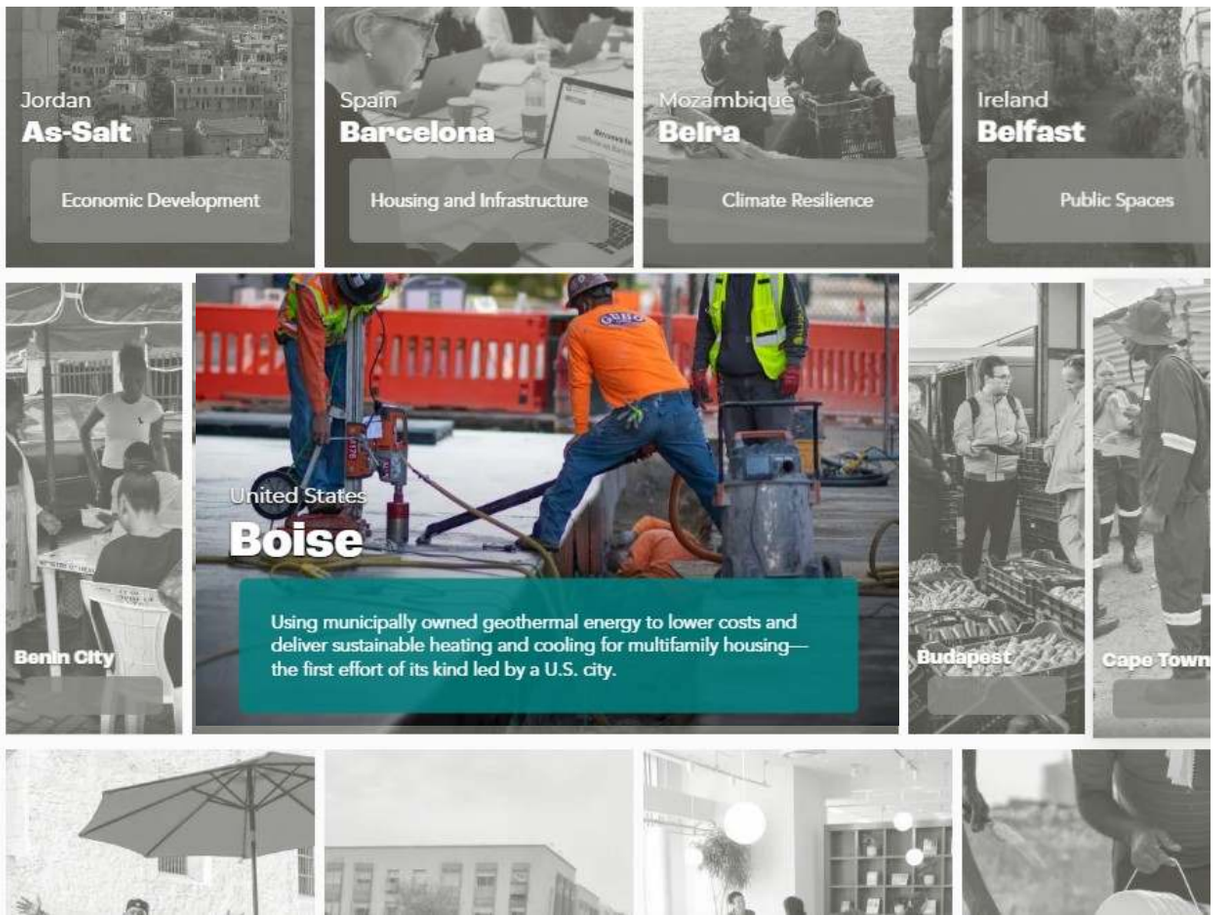
INNOVATION – AFFORDABLE HOUSING

New award allows Boise to become first city to use geothermal for affordable housing

by Joel Hroma | Tue, February 24, 2026 at 2:13 PM



Rendering of Capitol Campus building



BLOOMBERG MAYORS CHALLENGE

Out of over 630 applications worldwide…



Boise was chosen as one of 24 finalists!



INNOVATION – EXPAND GEOTHERMAL TO LOWER UTILITY BILLS

Success at our first affordable housing pilot unlocks future impact

- Lower residents' heating bills by up to 80%
- Create a model for expansion
- Address climate and affordability



WHAT WOULD A UTILITY REDUCTION MEAN?

"I would have to put on my glasses; I can't even comprehend that [amount]. It's…a big deal."

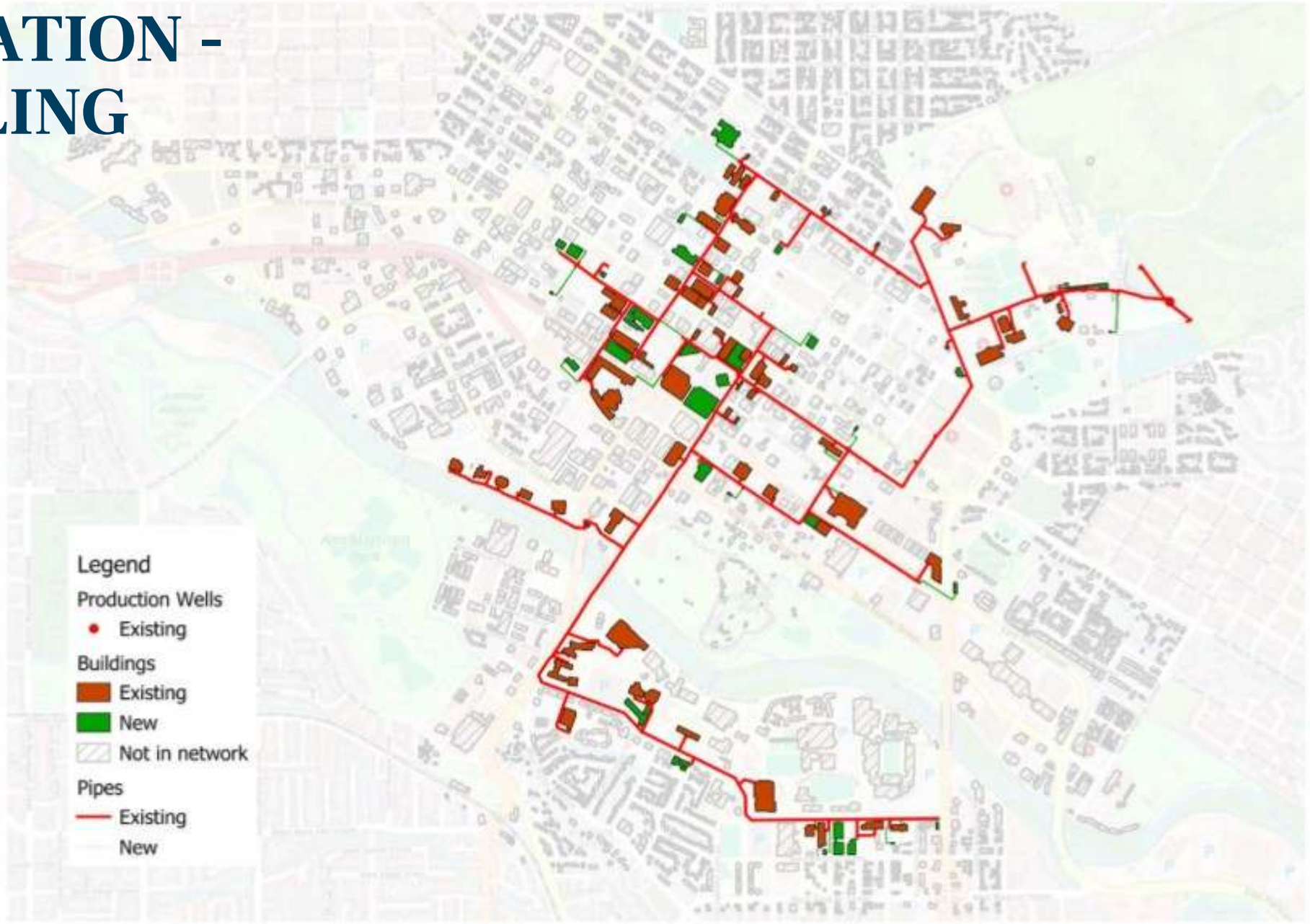
"I pay my phone, power, rent, gas, then whatever is left is food… [cost] is a 10 out of 10 important"

INNOVATION - MODELING

- In collaboration with ERM, we used heat-network optimization and hydraulic modeling to identify a preferred expansion strategy for the geothermal utility.
- The analysis identified approximately 466 million gallons per year of annual production as the system's practical sweet spot – a level that allows us to serve more customers without requiring major upgrades.
- Further expansion is possible, but would require increasingly significant infrastructure investment, with diminishing financial returns.
- The study has helped identify priority areas and target outreach based on building location, size, and potential system value.

INNOVATION - MODELING

FIGURE 18 THERMOS SOLUTION WHEN AVAILABLE PRODUCTION CAPACITY IS 466 MG/YR[30]



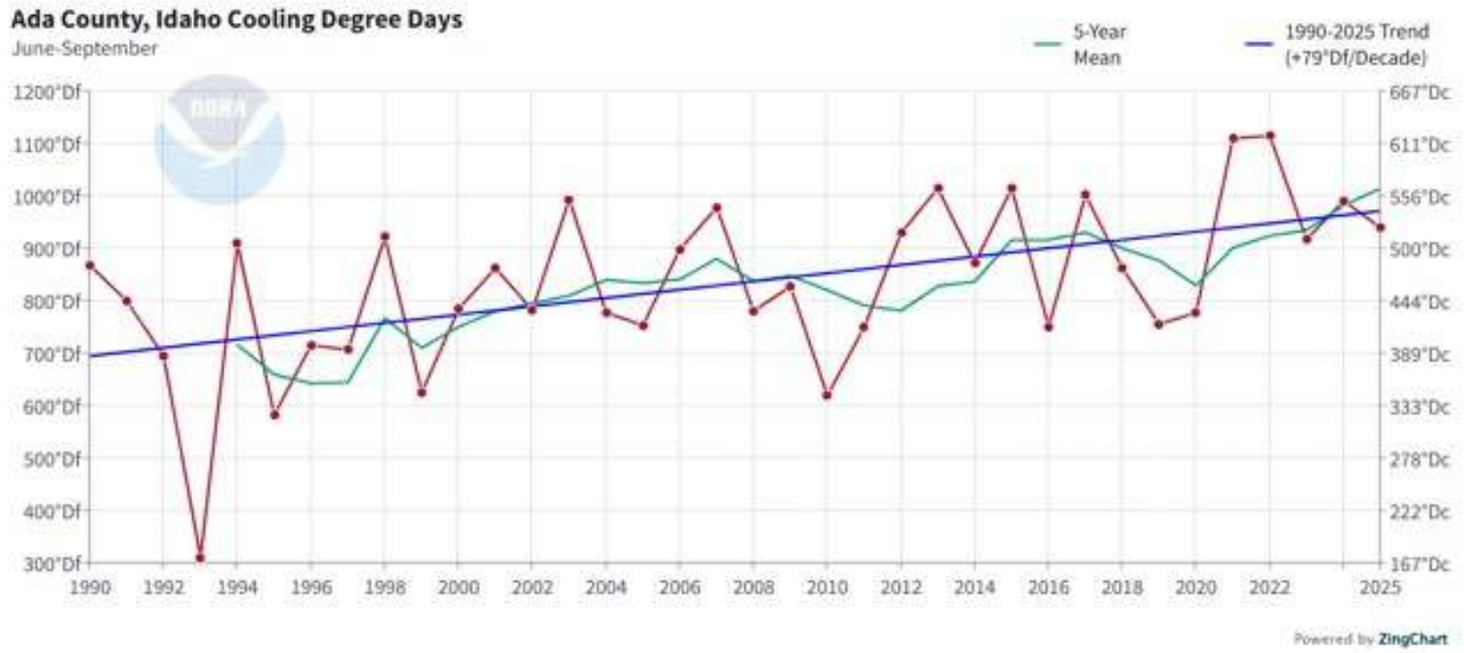
INNOVATION – COOLING?

- Boise is becoming increasingly cooling-dominant
- There is high and sustained interest in a geothermal cooling district
- Some technologies offer interesting solutions, but with high water demand
- We will continue to investigate cooling!

2.3 LOCAL WEATHER

Cooling degree days (CDD) for the summer months show a steadily increasing trend in Boise, with the most recent five-year average reaching more than 300 CDD (see Figure 4). This is a measure of how much, and for how long, the average ambient air temperature was above a specific base temperature, usually 65 °F in the U.S.

FIGURE 4 COOLING DEGREE DAYS FOR JUNE TO SEPTEMBER IN BOISE[11]



NOAA National Centres for Environmental information, Climate at a Glance: County Time Series, published January 2026, retrieved on January 23, 2026 from https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/county/time-series

FUTURE INNOVATION – POWER PRODUCTION?

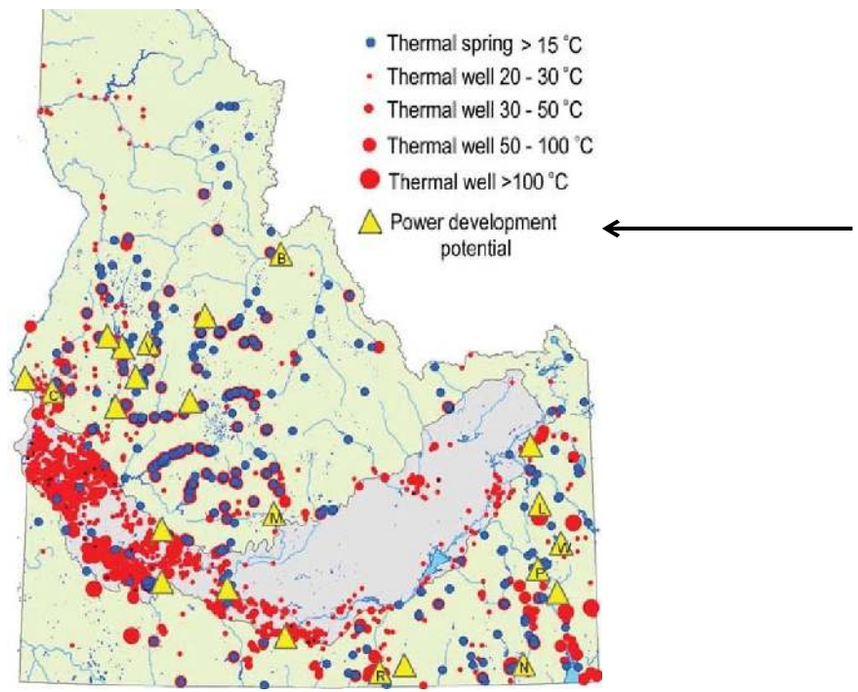
BLM to auction 35 geothermal leases across 113,330 acres in Idaho

Story by CBS2 News Staff • 1w • 2 min read

Utility Dive · 1mon

Record-setting geothermal bid signals rising interest in federal leases

The federal geothermal leasing program provides a pathway for developers to access public lands as demand grows for additional sources of reliable electricity. The June auction offered 68 parcels ...



RESOURCES

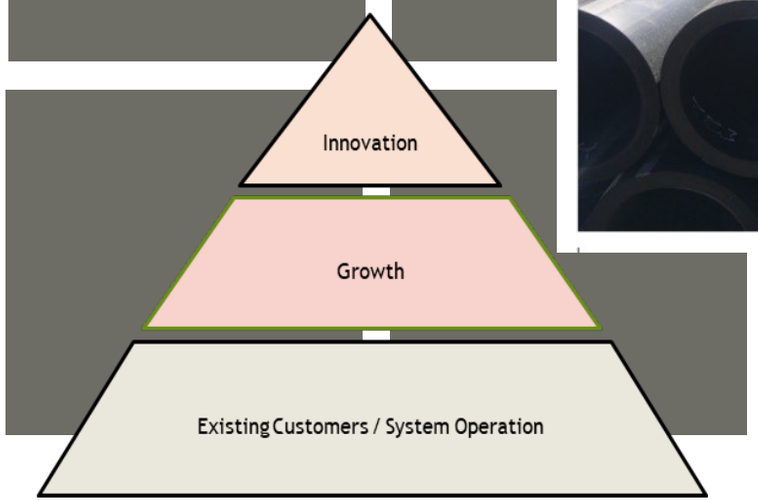
US awards $99M for geothermal drilling projects including Idaho

The US Department of Energy has allocated up to $99 million to 21 projects advancing geothermal energy technologies, including enhanced geothermal systems in Idaho. This funding aims to support field-scale tests and exploration drilling to unlock geothermal resources, promoting reliable and affordable power across the United States.









RECAP- WHAT'S NEXT?

- **Grow the geothermal system**
  - Infill & expansion
  - Asset replacement prior to failure
- **Continue to study incorporation of cooling district**
- **Showcase geothermal**
  - Heated park, bike lanes, bus stops, community greenhouse
- **Feasibility of Hot Springs/Resort**
- **Small scale power generation**
- **Innovative technologies & materials**

DISCUSSION